



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 2
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June 28, 2006

MEMORANDUM

SUBJECT: National Remedy Review Board Recommendations for the
Bridgeport Rental and Oil Services Superfund Site

FROM: John S. Frisco, Manager
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EPA Region 2 *John Frisco*

TO: David E. Cooper, Chair
National Remedy Review Board

This is in response to your memorandum, dated April 28, 2006, which provides the advisory recommendations of the National Remedy Review Board (NRRB) in connection with its review of the proposed remedial actions for contaminated media (i.e., soils, wetlands, light non-aqueous phase liquids (LNAPLs), and shallow and deep groundwater) at the Bridgeport Rental and Oil Services (BROS) Superfund site in Logan Township, New Jersey. The Region has designated this phase of work at the site as Operable Unit 2 (OU-2).

Let me first express my appreciation to the Board for its very thorough review of the large amount of technical material provided in support of the proposed actions at the site. Our specific responses to the Board's advisory recommendations are provided herein. For convenience purposes, each recommendation/finding is presented in the order identified in your memorandum followed by the Region's response.

NRRB Comment 1:

In the package presented to the Board, broad remedial action objectives (RAOs) were mentioned; however, a number of them did not appear to be consistent with the NCP or EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final (October 1988, EPA 540/G/89/004, OSWER 9355.3-01 (EPA 1988)). For example, the Region may want to refer to the EPA policy, stated in the NCP, to "expect to return usable ground waters to their beneficial uses wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site." (40 CFR §300.430 (a)(1)(iii)(F)). Also, the package presented to the Board did not identify numerical cleanup levels for on-property areas. The Board recommends that the Region develop RAOs and cleanup goals that are consistent with EPA regulation and guidance for all areas, and include them in the decision documents for the site. As explained in RI/FS guidance (EPA, 1988), generally cleanup levels should be based on applicable or relevant and appropriate requirements or risk assessment.

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Regional Response 1:

The Region recognizes that the return of groundwater to its beneficial use wherever practicable is a goal of the Superfund program; it also is a goal of the proposed remedy for the Bridgeport site. The Bridgeport site lies within a groundwater area designated by the State of New Jersey as Class II-A. The primary use of such groundwater is as a potential potable water source. As explained more fully below, one of the remedial action objectives is to restore the quality of the contaminated groundwater to again enable it to be used as a drinking water supply.

The Region agrees that numerical cleanup levels should be established for all impacted areas and media and included in the decision documents for the site. Although the Board package did not identify cleanup levels for on-property areas, they will be provided in the upcoming decision documents. Briefly, the numerical cleanup levels for groundwater include federal and state maximum contaminant levels (MCLs) and state groundwater quality standards. For soils, the on-property and off-property cleanup goals are based on state criteria for restricted (i.e., commercial/industrial) and unrestricted (i.e., residential) uses, respectively. An RAO has also been developed for LNAPLs (based on state requirements) which calls for the removal of such liquids to the extent practicable.

While every effort will be made to ensure actions are implemented to achieve these goals, site-specific conditions may impact the timeliness and practicability of returning the on-property groundwater to its former beneficial use. Most significantly, the presence of both free phase and residual LNAPL floating on, above and below the water table distributed around the former lagoon, and residual LNAPL extending beneath the former lagoon will remain a source of dissolved phase constituents for an extended period of time.

NRRB Comment 2:

The Board recognizes that there is a significant degree of uncertainty associated with the effectiveness of the preferred alternative. For example, the package presented to the Board did not provide information on the effectiveness of bioslurping for soil hot spots and LNAPL areas. As a result of these uncertainties, the Region prefers an adaptive management approach to site remediation. Toward this end, the Board recommends that the Region establish clear decision criteria for implementing sequential or contingency remedies in its use of this approach. Also, based on the information presented to it, the Board notes that there does not appear to be enough information available at this time to determine the appropriateness of a Technical Impracticability (TI) waiver for portions of the site (e.g., on-property areas). Consequently, the Region may want to consider the option of issuing an interim, rather than a final Record of Decision.

Regional Response 2:

The Region acknowledges the Board's observation about the uncertainty associated with the effectiveness of the preferred alternative. The innovative technologies that comprise the preferred alternative have the potential to remediate site contamination at a lower cost than more conventional technologies. One such technology - bioslurping - is believed to offer such benefits

in addressing LNAPL areas. Because of their potential benefits, the Region incorporated the innovative technologies into the proposed remedy for the site. These potential benefits notwithstanding, the uncertainty as noted by the Board influenced the overall approach for site remediation. In the short term, the Region is adopting an adaptive management approach. Technologies will be implemented and their effectiveness evaluated; adjustments will then be made in sequential technologies based on the results of prior actions. We believe this will allow for the highest degree of success to remediate the contamination at the site. Along the way, the success of individual technologies and the overall remedial approach will be gauged by various performance criteria which will need to be developed.

In the longer term, instead of the interim Record of Decision (ROD) option suggested by the Board, the Region plans to identify a contingency remedy in the upcoming OU-2 decision documents. The contingency remedy will involve hydraulic containment via a more conventional groundwater extraction and treatment program. The need for a TI waiver will likely accompany a decision to implement the contingency remedy. Any such waiver will be the subject of the appropriate administrative process including public participation. It will also be necessary to establish criteria to trigger the implementation of the hydraulic containment contingency remedy.

NRRB Comment 3:

PCBs are a significant contaminant of concern in some media and areas of the site. In the material presented to the Board, the 1998 PCB mega-rule is cited. However, it appears that aspects of this rule may be incorrectly applied at this site. For example, the 50 ppm PCB cleanup level for the de manifestis area of the wetlands appears to be inconsistent with the mega-rule. Also, the criteria for disposal in a municipal landfill outlined in the package appear to be incorrect. The Board recommends that the Region examine the proposed remedy to ensure that the Toxic Substances Control Act PCB remediation waste regulations are correctly applied.

Regional Response 3:

The Region will ensure that Toxic Substances Control Act (TSCA) regulations are properly applied. The distribution of residual LNAPL in hydric soils, lead concentrations greater than 1000 milligrams per kilogram (mg/kg), and the site-specific risk assessment were used collectively to determine the final boundaries of the *De Manifestis* area. The mapping of this area was conducted in consultation with the Region 2 biological technical assistance group (BTAG), the New Jersey Department of Environmental Protection (NJDEP), the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration (NOAA).

The referenced 50 mg/kg level actually relates to the TSCA regulatory requirements for the management of polychlorinated biphenyl (PCB) waste rather than identification of a safe cleanup level. In fact, the Region has proposed using a surface average cleanup for PCBs of 10 mg/kg which is the same cleanup goal established for the OU-1 action (i.e., tank farm and oil lagoon).

The Region reviewed the PCB criteria for disposal in a municipal landfill outlined in the Board package and the Feasibility Study (FS) and believes they are correctly stated in relation to 40

CFR Part 761. For example, on page 29 of the Wetlands portion of the package, it indicates that off-site disposal of excavated sediments containing PCBs greater than 50 mg/kg must be in a federal or state-permitted hazardous waste landfill or PCB disposal facility in accordance with applicable TSCA regulations. Sediments containing PCBs at concentrations less than 50 mg/kg can be disposed of in a municipal or solid waste landfill.

NRRB Comment 4:

The treatability study results for the wetland sediments were summarized in the package presented to the Board. The sediments were treated with 20 percent by weight cement kiln dust; on average, the PCB concentrations appear to be reduced by two-thirds. The Board recommends that when evaluating this or other treatment of PCB-contaminated media at the site, the Region consider conducting a mass balance on the PCBs.

Regional Response 4:

The Region agrees with the recommendation to conduct a PCB mass balance when evaluating PCB treatment options. This will help determine the actual degree of reduction associated with the various treatment processes. In addition, we will ensure that PCBs removed from Little Timber Creek Swamp are disposed of properly (i.e., consistent with 40 CFR Part 761).

NRRB Comment 5:

The Board notes that the Ecological Risk Assessment for the wetlands area does not appear to have followed the appropriate Superfund guidance: Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments - Interim Final, June 1997, EPA 540-R-97-006. Specifically, the ecological site conceptual model is incomplete, as presented to the Board, and does not effectively link contaminants to actual or potential ecological receptors. Consequently, the Board could not correlate sediment contaminant levels to exposure estimates. The Board recommends that the Region describe those ecological receptors to be protected and the relevant ecological end points and measures of exposure or measures of effect, consistent with Ecological Risk Assessment Guidance for Superfund (EPA, 1997), cited above.

Regional Response 5:

Information on the relevant ecological endpoints, measurement endpoints and measures of effect are detailed in the ecological risk assessment appended to the Remedial Investigation (RI). The Region assumes that the Board comment is referring to Figure 3 of the Wetlands package (Conceptual Site Model for Fate and Transport of Chemicals of Potential Ecological Concern (COPECs) at the BROS Site). This figure illustrates the physical transport processes and resulting chemical distribution documented during the RI. However, it is only one of several ecological risk figures, not all of which were provided to the Board (due to the sheer volume of RI material and time available for the Board presentation). There are numerous other illustrative figures (i.e., Figures 3, 6, 7, 8, 9, 10 and 11; Ecological Risk Assessment; AMEC, 2003) that link COPECs to actual or potential ecological receptors. These figures were prepared in consultation

with the BTAG and trustees during the Work Plan stage and at each subsequent decision point in the eight-step ecological risk assessment guidance (EPA-540-R-97-006).

Regarding the SDs' assessment, adverse effects on vegetation, aquatic invertebrates, small mammals, birds and carnivores were selected as relevant assessment endpoints. For Little Timber Creek Swamp, vegetation communities, aquatic communities, higher trophic level mammals (red fox) and higher trophic level birds (Eastern screech owl) were selected as assessment endpoints. For Cedar Swamp, aquatic organisms (white perch), piscivorous (fish eating) birds (great blue heron), higher trophic level mammals (red fox) and higher trophic level birds (Eastern screech owl) were selected. These receptor species were considered representative of local wildlife populations and were selected based on their potential exposure and susceptibility to adverse effects of site contamination. The risks associated with these endpoints will be described in the site decision documents.

NRRB Comment 6:

The package presented to the Board did not include numerical, risk-based ecological remediation goals that are normally developed during an RI/FS. The Board notes that the preferred alternative includes the removal of contamination from a portion of the wetlands area impacted by a previous breach in the waste oil lagoon. However, no risk assessment information was presented for this area. Rather, the ecological risk assessment evaluated relatively uncontaminated areas and did not develop any cleanup levels for the most heavily contaminated areas. As a result, the Board was unable to discern the contaminant remedial goals within the wetlands area and could not evaluate estimated reduction in risk associated with the proposed action. The Board recommends that the Region develop a range of remediation goals based on an ecological risk assessment. This approach would help ensure that the wetlands remediation achieves the Region's remedial action objectives.

Regional Response 6:

The RI documented that the distribution of elevated concentrations of chemicals of concern (COCs) is strongly associated with residual LNAPL in the wetland hydric soils/sediment in relatively close proximity to the BROS site. There is a rapid decrease in COC concentrations outside of the area containing residual LNAPL. The Settling Defendant project team recognized this pattern early in the RI and limited the quantification of risks in the area designated as the *De Manifestis* Zone (DMZ) while making the following observations:

- (1) In the area where LNAPL residuals remain in sediment, other associated COCs were detected at concentrations two to twenty-six times the severe effects sediment screening thresholds; and,
- (2) The residual LNAPL directly resulted in the replacement of a red maple swamp with a less desirable *Phragmites* community. The LNAPL residuals continue to inhibit recovery of the red maple swamp based on detailed vegetation analysis in and beyond the DMZ.

The focus of the ecological risk assessment was then placed on the area outside of the DMZ. Within this area, a detailed quantification of risks based on multiple lines of evidence determined that the risks posed to ecologically relevant receptors outside the DMZ were characterized by hazard quotients less than 1.0 and were not significantly different from reference areas. Reference areas were selected in careful consultation with BTAG and the trustees.

The conclusion of the risk assessment was that the DMZ causes a complete and obvious change in the community, which ends approximately where residual LNAPL is no longer observed in the hydric soils and sediment. After consultation with BTAG and the trustees, the boundary was extended to include the entire area where lead exceeds 1000 mg/kg as an additional safety factor. Based on this analysis and the subsequent FS, removal of the LNAPL in the area defined as the DMZ will also result in the removal of other primary COCs, and restoration of surface water to appropriate standards. For example, the concentrations of PCBs in hydric soils and sediment will be reduced to less than 10 mg/kg on average with no exceedances above 25 mg/kg. These RAOs and others are identified in the Board package and in greater detail in the FS. However, in response to the Board's comment, the Region will more clearly identify the numerical goals in the decision documents.

NRRB Comment 7:

The Board notes that the human health baseline risk assessment presented as part of the "Soils, LNAPL, and Shallow/Deep Ground Water" package does not follow EPA risk assessment guidance. For example, the risk assessment assumes that institutional controls are in place and effective. The Board acknowledges that this action follows several previous actions at this site and that this risk assessment is not being used as the justification for taking remedial action. The Board recommends that the Region ensure that the decision documents explain how the approach taken in this action results in a protective remedy. In addition, the Board notes that residential land use assumptions were used to evaluate the vapor intrusion pathway, which may be very conservative depending upon the future land use at the BROS site.

Regional Response 7:

The Region acknowledges the issue raised by the Board involving the human health risk assessment – in particular, the assumptions that institutional controls (ICs) are in place and effective. Such assumptions would generally not be considered in a baseline human health risk assessment designed to justify the need to take action.

While the Settling Defendants did not provide a residential risk scenario for use of the groundwater immediately beneath the site, sufficient documentation was provided to indicate that the risk under this exposure scenario would significantly exceed threshold values. The SDs did rely heavily on the assumption that groundwater beneath the BROS property would not be used for potable water supply purposes due to the extent of contamination, and the fact that regulatory controls and deed restrictions rendered a potable use scenario unrealistic. These controls, however, were not considered as a basis to avoid active remediation of the groundwater.

The Region will describe the risks associated with each media area of concern in the site decision documents. In addition, as suggested by the Board, the Region will ensure that the decision documents explain how the approach taken at the Bridgeport site is expected to result in a fully protective remedy.

In regard to the comment that the residential land use assumptions used to evaluate the vapor intrusion pathway may be very conservative, the Region notes that the materials provided to the Board could have been clearer concerning the models and assumptions used to evaluate this pathway. Based on comments provided to the SDs by the Region, the default assumptions for risk calculations in the Johnson and Ettinger Model were adjusted to reflect industrial or commercial exposures. For example, the number of days per year of exposure and number of years of exposure were adjusted. However, the risk estimates are still conservative as they assumed a 24-hour (residential-like) per day exposure. Nevertheless, the Region believes a conservative approach is appropriate since the land immediately beyond the BROS property may be developed for residential use in the future.

NRRB Comment 8:

The Board recommends that the Region develop an alternative that provides protection of human health and the environment primarily through containment. This alternative might be useful as a stand-alone alternative or as a contingency in case the innovative treatment alternatives considered as part of the preferred remedy are less effective than desired. The Board also recommends that a contingency plan be developed which may be implemented if necessary.

Regional Response 8:

The Region fully agrees with the Board comment. In fact, Alternatives DGW-4 and DGW-5 incorporate two variations of containment pumping and treatment. In addition to intercepting COCs from the deep groundwater principal threat zone (PTZ), these alternatives would contain any COCs originating in shallow groundwater because the flow path from the shallow zone is through the base of the deeper aquifer where the containment system was evaluated. As noted in its presentation to the Board, the Region is proposing to include Alternative DGW-4 as a contingency remedy for deep groundwater (and residual sources) if the innovative treatment technologies comprising the preferred remedy are found to be ineffective in achieving cleanup goals.

NRRB Comment 9:

The Board recommends that the Region include in the site decision documents an explanation of the goals of the mass removal pump & treat action and the in-situ chemical oxidation (ISCO) action in the "principal threat zone" (PTZ), including the rationale for their implementation and for the sequence in which they are applied.

Regional Response 9:

The Region agrees with the Board comment and will provide an explanation of the goals of the mass removal pump and treat action as well as the subsequent in-situ chemical oxidation action in the site decision documents. The overall goal of deep groundwater remediation is to restore the aquifer to protect against groundwater ingestion above MCLs and state groundwater quality standards.

More specifically, the recommended alternative for remediation of the PTZ includes a phased combination of technologies to both reduce the mass of contamination in the aquifer through pumping and also provide in-situ treatment. First, groundwater extraction with ex-situ treatment would be accomplished to reduce the mass of contamination in the PTZ. An estimated 30 million gallons of water would be extracted during an approximate fourteen-month period. Next, two or more iterations of ISCO treatment (within a two to three-year period including post injection monitoring) would be performed. ISCO will be undertaken concurrent with groundwater extraction (over 60 million gallons) to facilitate distribution of the oxidants into the target areas. Multiple applications of ISCO will allow for a targeted treatment approach which addresses the highest concentrations and/or rebound areas as well as allow for optimization of the treatment process (i.e., potential shift from hydrogen peroxide to potassium permanganate). After the PTZ is pumped and treated, an estimated 450 million gallons of groundwater would be extracted from the lower threat zone (LTZ) to effectuate further mass reduction in the aquifer. The physical, chemical and biological conditions in both the PTZ and LTZ will be substantially different and better understood following pumping and ISCO treatment. At that point in time, enhanced bioremediation in select areas may be implemented to further reduce contaminant levels. More detailed information is provided in the FS.

NRRB Comment 10:

The preferred remedy in the package presented to the Board includes the injection of hydrogen peroxide (H_2O_2) as a method of ISCO to remediate organic contaminants in the deep groundwater PTZ. Based on the experience of the EPA Office of Research and Development's Ground Water Technical Support Center, there may be a number of issues associated with this technology that make it difficult to deploy in this context and make its results highly unpredictable. The package presented to the Board lacked sufficient information (i.e., treatability study details) to allow a satisfactory review of the application of this technology at this site by the Board. The Board recommends that the merits of H_2O_2 injection, and the advantages and limitations of ISCO using other oxidants (e.g., permanganate), be re-evaluated.

Regional Response 10:

The FS development process included a detailed analysis of ISCO options to address the deep groundwater PTZ. That analysis is presented in the FS and its attachments. In addition, the BROS Technical Committee engaged two independent experts to review the ISCO analysis and conceptual design. The Region recognizes there are difficulties associated with this technology

but also believes it may be beneficial in the site-specific setting at BROS. Some of the key factors in selecting Fenton's Reagent ISCO included:

- The low pH (<5) and high iron concentrations (>1,000 milligrams per liter) in the PTZ are ideal for Fenton's Reagent.
- The treatability studies for Fenton's Reagent yielded favorable results. Those studies were conducted in coordination with EPA's Office of Research and Development technology specialists (in Cincinnati, Ohio) and independently reviewed by experts in the field of ISCO.
- Permanganate was considered but the entire PTZ would have to be pH adjusted to near neutral or alkaline conditions to establish favorable conditions. Such an effort is not believed to be cost-effective compared with pumping enhanced and regulated application of Fenton's Reagent. However, as discussed in the FS, the Region believes that permanganate should be considered for any recalcitrant sub-areas following the applications of Fenton's Reagent/pumping and treatment. These latter actions will likely create physical/chemical conditions at the base of the deeper aquifer more favorable to a focused application of permanganate.

NRRB Comment 11:

The information package provided to the Board reports that aerobic biostimulation tests resulted in a 91 to 98 percent removal of volatile organic compounds (VOCs). The package also states that anaerobic biostimulation had minimal impact on the contaminants of concern. However, many studies show that chlorinated ethanes and ethenes generally are more vulnerable to reductive dechlorination under anaerobic conditions than biodegradation under aerobic conditions, which is contrary to what was reported in the package presented to the Board. The Board recommends that the Region re-evaluate the type of biostimulation (aerobic vs. anaerobic) and the resulting degradation rates being considered for this site.

Regional Response 11:

The Region believes that the recommended re-evaluation will occur during the implementation of the biostimulation components of the remedy. The RI, FS and treatability study contain detailed evaluations of the type of biodegradation that occurred in the past and is presently ongoing. A combination of conditions at the site is believed to support the concurrent degradation of chlorinated solvents (VOCs and bis-2-chloroethyl ether) and benzene-toluene-ethylene-xylene (BTEX) compounds. More specifically, the past occurrence of strongly anaerobic conditions is evident by the widespread distribution of relatively high concentrations of methane throughout the entire BROS site (Figures 5-14 and 5-15 of the RI Report). However, somewhat oxidizing conditions have returned throughout much of the site. The co-occurrence of oxygen, abundant methane, and methanotrophic bacteria leads to the production of the enzyme methane monooxygenase. The substratum for this enzyme is methane, but research has shown that methane monooxygenase has a broad affinity for chlorinated hydrocarbon substrata,

including a wide array of chlorinated solvents. Consequently, co-metabolic degradation of chlorinated solvents may be occurring downgradient of source areas where substantial concentrations of methane are widely distributed. In addition, because of oxidizing conditions in this area, BTEX compounds are also expected to readily biodegrade in the downgradient area by other metabolic pathways.

High sulfates or other total dissolved solid (TDS) constituents associated with the past release of concentrated sulfuric acid in deep groundwater probably account for the reduced anaerobic degradation of some COCs. If the high TDS/sulfates can be sufficiently reduced during the initial stages of remedy implementation, however, anaerobic biodegradation may be able to effectively treat some of the residual chlorinated organic contaminants.

NRRB Comment 12:

The cost information provided to the Board uses a discount rate of five percent, which is inconsistent with EPA's guidance for cost estimating during the Feasibility Study (EPA 540-R-00-002; OSWER 9355.0-75). The Board recommends that the cost information reflect the seven percent discount rate indicated in the above-noted guidance.

Regional Response 12:

EPA's 1988 *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA* (USEPA, 1988a) recommends that a discount rate of 5 percent be used for present worth analyses. This guidance has since been superseded by OSWER Directive 9355.0-075 – *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (USEPA, 2000c). This more recent guidance adopts a discount rate of 7% based on the Office of Management and Budget's Circular A-94, *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs* (OMB, 2004). The OSWER Directive, however, acknowledges that there may be circumstances in which it would be appropriate to consider the use of a lower or higher discount rate than 7% for the FS present value analysis. The directive goes on to say that if a different discount rate is selected for the analysis, a specific explanation should be provided. The 7% discount rate contained in the main portion of Circular A-94 is not updated on an annual basis. Appendix C of this circular is updated each year around the time of the President's budget submission to Congress. The February 2004 update of Appendix C of Circular A-94 presents *Real Discount Rates*, based on economic assumptions used in the President's budget, of 3.5% for 30-year maturities.

Based on the above, the Settling Defendants adopted a discount rate of 5% for performing the present worth analyses in the FS. This rate is not believed to be unreasonable given current and forecasted economic conditions over the projected remedial action period along with the relatively conservative investment nature of funds by the BROS responsible parties.

NRRB Comment 13:

The Board notes that there does not appear to have been a great deal of involvement by Federal or State natural resource trustees at this site. Because the cleanup includes significant work in wetlands, the Board recommends that potential trustee concerns be identified.

Regional Response 13:

The Region agrees that potential trustee concerns are an important element of the Wetlands RI/FS. Several natural resources trustees including USFWS and NOAA as well as BTAG (which includes state representation) were directly involved throughout the RI/FS process. Representatives from these groups were present for several site visits (during preparation of the Work Plan). They provided input on species surveys, sampling designs and reference site locations, and regularly attended project updates/meetings. At the meetings, investigation data were reviewed; additional sampling was planned and ecologically relevant receptor species were selected. Comments from the trustee representatives were incorporated into the risk characterization, including adding an assessment of the potential future occurrence of mink in Little Timber Creek Swamp. More recently, the trustees were consulted during the preparation and evaluation of remedial alternatives for the Wetlands FS.

In closing, we again want to thank the Board for its comprehensive review of the information provided for the cleanup of the remaining contamination at the Bridgeport site. The Board's comments will help ensure that an appropriate remedy is selected for the site.

If you have any questions regarding this correspondence, please do not hesitate to contact me.